PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : E04D 13/14	A1	(11) International Publication Number: WO 99/27211
		(43) International Publication Date: 3 June 1999 (03.06.99)

(21) International Application Number: PCT/DK98/00484

(22) International Filing Date: 10 November 1998 (10.11.98)

(30) Priority Data:
PA 1997 01272 10 November 1997 (10.11.97) DK

(71) Applicant *(for all designated States except US)*: VELUX INDUSTRI A/S [DK/DK]; Tobaksvejen 10, DK–2860 Søborg (DK).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: PICCO, Vincenzo [DK/DK]; Odsvej 14, DK–3000 Helsingør (DK).

(74) Agents: JØRGENSEN, Bjørn, Barker et al.; Internationalt Patent–Bureau, Høje Taastrup Boulevard 23, DK–2630 Taastrup (DK).

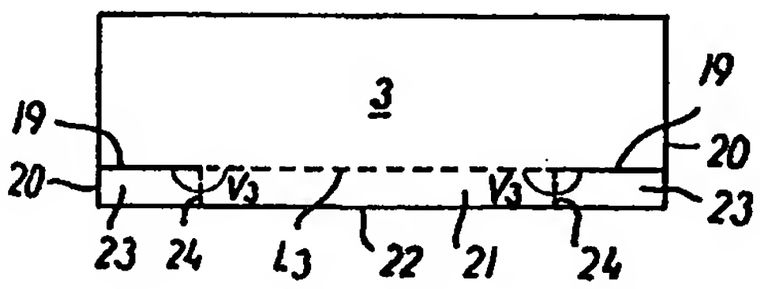
(81) Designated States: AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

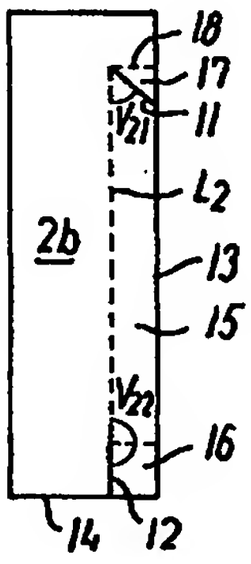
Published
With international search report.
In English translation (filed in Danish).

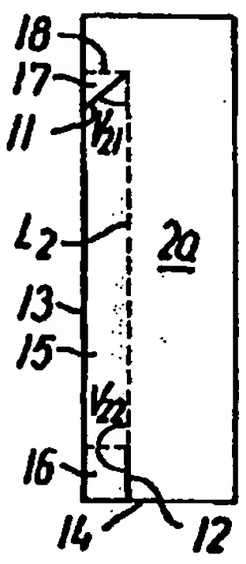
(54) Title: A KIT OF ELEMENTS AND A METHOD OF USING THE KIT FOR FLASHING A ROOF–PENETRATING ELEMENT

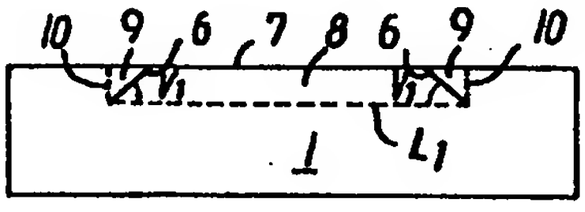
(57) Abstract

The kit is made from sheet material for flashing a quadrangular roof–penetrating element, for instance a window (4), in an inclined roof (5) with a substantially plane surface, which material comprises a first element (1) with two through cuts (6) extending convergingly from the ends of a first line segment (L_1) to an edge (7) of this element (1), a second element (2a) with two through cuts (11, 12), which cuts extend from each end of a second line segment (L_2) obliquely to an edge (13) of the element (2a) under formation of an acute angle (V_{21}) with the line segment (L_2) and obliquely or straight to an edge (14) of the element (2a) under formation of an obtuse or straight angle (V_{22}) with the line segment (L_2), respectively, an element (2b) mirror–inverted relative to the second element (2a), a third element (3) with two through cuts (19), which elements extends from each end of a third line segment (L_3) extends to each their respective edge (20) of the element (3) under formation of an obtuse or straight angle (V_3) with the line segment (L_3).









FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	**ES**	Spain	**LS**	Lesotho	**SI**	Slovenia
AM	Armenia	**FI**	Finland	**LT**	Lithuania	**SK**	Slovakia
AT	Austria	**FR**	France	**LU**	Luxembourg	**SN**	Senegal
AU	Australia	**GA**	Gabon	**LV**	Latvia	**SZ**	Swaziland
AZ	Azerbaijan	**GB**	United Kingdom	**MC**	Monaco	**TD**	Chad
BA	Bosnia and Herzegovina	**GE**	Georgia	**MD**	Republic of Moldova	**TG**	Togo
BB	Barbados	**GH**	Ghana	**MG**	Madagascar	**TJ**	Tajikistan
BE	Belgium	**GN**	Guinea	**MK**	The former Yugoslav Republic of Macedonia	**TM**	Turkmenistan
BF	Burkina Faso	**GR**	Greece			**TR**	Turkey
BG	Bulgaria	**HU**	Hungary	**ML**	Mali	**TT**	Trinidad and Tobago
BJ	Benin	**IE**	Ireland	**MN**	Mongolia	**UA**	Ukraine
BR	Brazil	**IL**	Israel	**MR**	Mauritania	**UG**	Uganda
BY	Belarus	**IS**	Iceland	**MW**	Malawi	**US**	United States of America
CA	Canada	**IT**	Italy	**MX**	Mexico	**UZ**	Uzbekistan
CF	Central African Republic	**JP**	Japan	**NE**	Niger	**VN**	Viet Nam
CG	Congo	**KE**	Kenya	**NL**	Netherlands	**YU**	Yugoslavia
CH	Switzerland	**KG**	Kyrgyzstan	**NO**	Norway	**ZW**	Zimbabwe
CI	Côte d'Ivoire	**KP**	Democratic People's Republic of Korea	**NZ**	New Zealand		
CM	Cameroon			**PL**	Poland		
CN	China	**KR**	Republic of Korea	**PT**	Portugal		
CU	Cuba	**KZ**	Kazakstan	**RO**	Romania		
CZ	Czech Republic	**LC**	Saint Lucia	**RU**	Russian Federation		
DE	Germany	**LI**	Liechtenstein	**SD**	Sudan		
DK	Denmark	**LK**	Sri Lanka	**SE**	Sweden		
EE	Estonia	**LR**	Liberia	**SG**	Singapore		

A KIT OF ELEMENTS AND METHOD OF USING THE KIT FOR FLASHING A ROOF PENETRATING ELEMENT

The present invention relates to a kit of elements of sheet material for flashing a quadrangular roof-penetrating element, for instance a window, a chimney, a ventilating duct or the like, in an inclined roof with a substantially plane surface, which material comprises one side suited for fastening to the roof surface by gluing, adhesion, welding or the like and a second weather-proof side.

The invention further relates to a method for flashing a quadrangular roof penetrating element, for instance a window, a chimney, a ventilating duct or the like, in an inclined roof with a substantially plane surface, in particular made from concrete, by means of a kit of elements of the type mentioned above.

Danish Patent No. 98982 discloses a "method for flashing corners on chimneys, dome light frames and the like protrusions on roofs with roofing felt and a bituminous sheet for use in such flashing". According to this publication, the corners of the protrusion (the roof penetrating element) are first covered by means of small textile reinforced bituminous sheets which are slit for the formation of flaps which are bent and melted together to form closed corners, following which bituminous felt sheets are mounted, said sheets extending on the sides of the roof penetrating elements forward to but not around the corners. It is said in this patent that it is known to use roofing felt strips extending from the roof surface and somewhat upwards along a side surface of the roof penetrating element, in which the part of the roofing felt extending upwards along the vertical surface at its edge is bent around the edge, a splitting of the strip being made until the

place, where the vertical edge meets the roof surface.

The above-mentioned method is further known from a working instruction from the firm Icopal. From the same working instruction it is known, on basis of a measurement of the dimensions of the roof penetrating elements, to cut elements from roofing felt, whereby cuts are made at the ends of some of the elements, said cuts extending in extension of premeditated folding lines, to make it possible to fold end portions of bent up portions of the elements around the corners of the roof penetrating element.

The object of the invention is to provide a kit of elements and a method for flashing a roof-penetrating element, said kit of elements facilitating the flashing and ensuring to a high extent that the finished flashing becomes impermeable to rainwater and the like.

This object is met by means of a kit of elements comprising

- a first element with two through cuts extending convergingly from the ends of a first line segment to one edge of this element,
- a second element with two through cuts, which cuts extend from each end of a second line segment obliquely to an edge of the element under formation of an acute angle with the line segment and obliquely or straight to an edge of the element under formation of an obtuse or straight angle with the line segment, respectively,
- an element mirror-inverted relative to the second element,
- a third element with two through cuts, which extend from each their end of a third line segment to each their respective edge of the element under formation of an obtuse or straight angle with the line segment.

In this way a kit of elements is provided which,

when mounted, forms a collar around the roof penetrating element, wherein the joints between the various overlappings are facing downwards such that water on the roof will tend to run away from and not into the joints.

The first and the third element are preferably symmetrical about the half-line normals of the respective line segments, at least in respect of the cuts and the folding lines, and the four elements are preferably rectangular. This provides for easy and economical production of the elements. One or more of the elements, and in particular the second one and the element mirror-inverted relative thereto, may be divided in smaller elements transversely to their respective line segments, the smaller elements overlapping one another when mounted.

It should be understood that by the element mirror-inverted relative to the second element is meant an element having two through cuts corresponding to the through cuts in the second element, in which the angles that the cuts form with the line segment of the mirror-inverted element do not have to be identical with the angles formed by the cuts in the second element. Likewise, the outer dimensions of the mirror-inverted element do not have to be identical with the dimensions of the second element.

Said acute angles are preferably approximately 45°, the tolerance being high.

In an embodiment of the kit intended for use in flashing of several adjacent roof penetrating elements, for instance windows, the kit comprises an element with two halves, one half of which constitutes a first element, and the second half of which constitutes a third element, and/or an element with two halves, one half of which constitutes a second element, and the

second half being mirror-inverted relative thereto. These further elements are used between the adjacent windows depending on whether they are placed above/below or next to one another. The kit will in this case be supplemented with further first, second mirror-inverted, and third elements according to need.

The object of the invention is further met by a method which is characterized in that

- the first element is bent along the first line segment and along lines extending under 90° from the end of the line segment to the same side as the cuts, that the upwards bent portions are secured to upwards extending side surfaces of the roof penetrating element, the portion positioned between the converging cuts being secured to a downwards facing side surface, following which the remaining portions of the element are fastened by gluing, adhesion, welding or the like to the roof surface,
- that the second element is bent along the second line segment and along a line which under an angle of 90° extends from the same end of the line segment and to the same side as the cut forming an acute angle, that the upwards bent portions are secured to side surfaces of the roof penetrating element, the portion positioned along the second line segment being secured to a second side surface adjacent to the downwards facing side surface and the portion forming an acute angle being placed on top, and the lower end of the portion positioned along the second line segment being bent towards and secured to the downwards facing side surface of the roof penetrating element, following which the remaining portions of the element are fastened by gluing, adhesion, welding or the like to the roof surface,
- that the element mirror-inverted relative to the

second element is fastened in a similar manner, and

- that the third element is bent along the third line segment, that the upwards bent portion is secured to the upwards facing side surface of the roof penetrating element and that the end portions of the upwards bent portion are bent around and secured to the second side surfaces, following which the remaining portions of the element are secured by gluing, adhesion, welding or the like to the roof surface.

The new and characteristic of this method is in particular that the elements are first secured on the side surfaces of the roof penetrating element, which is easily done with the elements according to the invention, whereafter the elements thus secured are fastened to the roof surface without any risk of displacement.

The method is in particular suitable in connection with concrete roofs, where the elements are directly fastened to the concrete surface and not to a previously laid out roofing felt, as is for instance known from the above working instruction.

The invention will now be described in detail in the following by means of an example of an embodiment with reference to the schematic drawing, in which

Fig. 1 shows four elements for a kit,

Figs 2-5 illustrate the mounting of the kit in connection with flashing of a roof penetrating element, Figs 2 and 3 showing a window frame in a roof surface seen in perspective from a point above the roof, below the window, and Figs 4 and 5 show the same window frame seen in perspective from another point above the roof, above the window,

Fig. 6 a combined first and third element, and

Fig. 7 a combined second element mirror-inverted relative thereto.

Fig. 1 shows four elements 1, 2a, 2b, 3 of a roofing felt material intended for mounting below, to the right of, to the left of and above a roof penetrating element to establish a tight connection between a roof surface and the roof penetrating element.

Figs 2-5 show a roof penetrating element in the form of a window frame 4 extending through a roof surface 5, in which by means of the elements 1, 2a, 2b, 3 a flashing is to be provided to form a sealing between the window frame 4 and the roof surface 5 to ensure that water on the roof surface 5 does not penetrate into the underlying building structure.

The elements 1, 2a, 2b and 3 may for instance be made from Icopal Base 550 ®, which comprises three layers: an upper cover layer of sanded SBS bitumen, a reinforcing layer placed in the middle of SBS bitumen impregnated polyester felt combined with glass felt and a lower extra thick layer of weldable SBS bitumen. This product has turned out to be particularly suitable in connection with the invention, but other products with similar properties may be utilized.

The four elements are designed as follows:

The element 1 has two through cuts 6 extending convergingly from each end of a line segment L_1 to one side edge 7 of the element 1. Thereby, an elongate flap 8 is provided, said flap extending along the line segment L_1, and two side flaps 8 extending between each their respective cut 6 and a line 10 extending from the end point of the line segment L_1 perpendicular thereto. The cuts 6 extend under an acute angle V_1 relative to the line segment L_1, V_1 being suitably 45°, but the concrete angle is of less importance provided it is acute and neither close to 0 or 90°.

The elements 2a and 2b are, in the embodiment shown, designed mirror-invertedly relative to each

other and have each two through cuts 11, 12 extending from respective end points of a line segment L_2. The cut 11 extends under an acute angle V_{21} relative to the line segment L_2 to a longitudinal side edge 13 of the element 2a, 2b, whereas the cut 12 extends under a substantially straight angle V_{22} from one end of the line segment L_2 to a short side edge 14 of the element 2a, 2b. In this way an elongate flap 15 is provided, said flap extending along the line L_2, and an end flap 16 which per se is constituted of the end portion of the elongate flap 15 and extends from the end point of the line segment L_2 to the short side edge 14, the end flap being at the mounting folded around a folding line extending substantially perpendicular to the line segment L_2, as will be seen later. Moreover, a side flap 17 is provided between the cut 11 and a line 18 extending perpendicular to the line segment L_2 from its end point at the cut 11.

The element 3 also comprises two through cuts 19, each extending from an end point of a line segment L_3 under a substantially straight angle V_3 to each their respective short side edge 20 of the element 3. In this way an elongate flap 21 is provided, said flap extending between the line segment L_3 and a longitudinal side edge 22 of the element 3. Moreover, two end flaps 23 are provided, said flaps extending from each their respective end point of the line segment L_3 to the adjacent short side edge 20, the end portions of the elongate flap 21 being at the mounting folded along lines 24 extending substantially perpendicular from each their respective end points of the line segment L_3, as will be seen below.

Both the element 1 and the element 3 are in the embodiment shown designed symmetrically around the half-line normal to the respective line segment L_1, L_3,

and all the elements 1, 2a, 2b, 3 are rectangular. Other shapes will, however, also be possible, and will in particular be of interest in connection with flashing of several adjacent windows, where the outer dimensions of the elements will be asymmetric as will be known from other types of flashing.

The mounting of the elements 1, 2a, 2b, 3 is carried out as follows:

The element 1 is placed as shown in Fig. 2. The length of the line segment L_1 is determined such that it is slightly larger than the width of the window frame 4, such that the end points of the line segment L_1 may get as close as possible to the corners 25, 26 of the window frame 4, regard being had to bending radii for the material of the element 1 at the line segment L_1 and the lines 10. The elongate flap 8 is fastened to the downwards facing side surface 30 of the window frame 4 and the side flaps 9 are fastened to each their respective one of the laterally facing side surfaces 27 of the window frame 4, for instance by means of nails, if the window frame 4 is made from a material which can receive nails, for instance wood. When the flaps 8, 9 are fastened and the element 1 thus fixated relative to the window frame, the remaining part of the element 1 is welded to the roof surface 5, the bitumen present on the under side of the element 1 being melted by a gas burner.

Then the elements 2a and 2b are mounted, the elongate flaps 15 being secured to the laterally facing side surfaces 27 of the window frame 4, and the side flaps 17 are fastened to the upwards facing side surface 28 of the window frame 4.

Just as the end points of the line segment L_1 may be brought quite close to the corners 25 and 26, as mentioned above, the upper end point of the line

segment L_2 may due to the fastening by means of both the elongate flap 15 and the side flap 17 be brought close to the respective upper corner 29 of the window frame 4. The end flaps 16 are bent around the respective corners 25, 26 and are fastened to the downwards facing side surface 30 of the window frame 4, where they cover the triangular areas 31 of the downwards facing side surface 30, which at the ends of the elongate flap 8 is not covered thereby. The length of the line segment L_2 being slightly larger than the length of the laterally facing side surface 27 of the window frame 4, the lower end point of the line segment L_2 will be positioned slightly further down the roof surface 5 than the adjacent end point of the line segment L_1, and in this way it is ensured that water running down over the surface of the element 2a, 2b at the line segment L_2 will be conveyed further down the roof surface 5 via the surface of the element 1 and not down into the underlying roof structure. When the flaps 15, 16, 17 of the respective element 2a, 2b are fastened to the window frame 4, the remaining parts of the element 2a, 2b are welded to the roof surface 5.

Finally, the elongate flap 21 of the element 3 is fastened to the upwards facing side surface 28 of the window frame 4, as shown in Fig. 5, and the end flaps 23 are bent around the corners 29 and fastened to the laterally facing side surfaces 27 of the window frame 4, where they cover the triangular areas 32 at the ends of the elongate flaps 15 which are not covered thereby. Then the remaining part of the element 3 is welded to the roof surface 5.

The length of the line segment L_3 being slightly larger than the width of the window frame 4, water running over the surface of the element 3 at the ends of the line segment L_3 will end on the element 2a, 2b

in question farther away from the laterally facing side surface 27 of the window frame 4 than the adjacent end point of the respective line segment L_2, for which reason this water will run down over the surface of the element in question 2a, 2b and not penetrate into the underlying roof structure. From the element 2a, 2b, water will be conveyed across the element 1, as described above, and further down over the roof surface 5. After the mounting of the elements 1, 2a, 2b, 3 a rail of a type known per se may be mounted on the upwards facing edge of the window frame 4, said rail preventing water from being conveyed down along the side surfaces 27, 28, 30 above the elongate flaps 8, 15, 21 and down behind them.

As mentioned, the angles V_1 and V_{21} are approximately 45°, but they only have to be acute. They should, however, not be too close to 0 or 90°, as in the first case the triangular areas 31, 32, respectively, will become very large, which requires correspondingly long end flaps 16, 23, respectively, and the side flaps 9, 17, respectively, become very long and have to be shortened, whereas in latter case the side flaps 9, 17, respectively, become too small to ensure a good fastening. The angles V_{22} and V_3 are straight (180°). If these angles become substantially smaller, the end flaps 16, 23, respectively, will not be able to cover the triangular areas 31, 32, respectively, in an adequate manner, and if they become substantially bigger, the mounting is made difficult, the result not having, however, necessarily to be leakage. The final dimensions of the elements 1, 2a, 2b, 3 are determined on basis of requirements to overlapping, said requirements being normally stipulated by the manufacturer of the roofing felt in question.

Fig. 6 shows an element 1' which at its upper side

is provided with the same cuts and lines present in the element 1, and which at its lower side is provided with the same cuts and lines present in the element 3. This element 1' may be used between two windows which are placed closely together, one above the other.

In a similar way, Fig. 7 shows an element 2c which at its left side is provided with the same cuts and lines present in the element 2a, and which at its right side is provided with the same cuts and lines present in the element 2b. This element 2c may be used between two windows which are placed closely together side by side.

P A T E N T C L A I M S

1. A kit of elements of sheet material for flashing a quadrangular roof-penetrating element, for instance a window (4), a chimney, a ventilating duct or the like, in an inclined roof (5) with a substantially plane surface, which material comprises one side suited for fastening to the roof surface by gluing, adhesion, welding or the like and a second weather-proof side, c h a r a c t e r i z e d in

- a first element (1) with two through cuts (6) extending convergingly from the ends of a first line segment (L_1) to one edge (7) of this element (1),
- a second element (2a) with two through cuts (11, 12), which cuts extend from each end of a second line segment (L_2) obliquely to an edge (13) of the element (2a) under formation of an acute angle (V_{21}) with the line segment (L_2) and obliquely or straight to an edge (14) of the element (2a) under formation of an obtuse or straight angle (V_{22}) with the line segment (L_2), respectively,
- an element (2b) mirror-inverted relative to the second element (2a),
- a third element (3) with two through cuts (19) which extend from each end of a third line segment (L_3) to each their respective edge (20) of the element (3) under formation of an obtuse or straight angle (V_3) with the line segment (L_3).

2. A kit of elements according to claim 1, c h a r a c t e r i z e d in that the four elements (1, 2a, 2b, 3) are rectangular.

3. A kit of elements according to claim 1 or 2, c h a r a c t e r i z e d in that one or more of the elements (1; 2a, 2b; 3) is divided in smaller overlapping elements transversely to their respective line segments (L_1; L_2; L_3).

4. A kit of elements according to claims 1-3, c h a r a c t e r i z e d in that said acute angles (V_1, V_{21}) are approximately 45°.

5. A kit of elements according to claims 1-4, c h a r a c t e r i z e d in comprising an element (1') with two halves, one half of which constitutes a first element, and the second half of which constitutes a third element, and/or an element (2c) with two halves, one half of which constitutes a second element, and the second half being mirror-inverted relative thereto.

6. A method for flashing a quadrangular roof penetrating element, for instance a window (4), a chimney, a ventilating duct or the like, in an inclined roof (5) with a substantially plane surface, in particular made from concrete, by means of a kit of elements according to claims 1-4, c h a r a c t e r i z e d in

- that the first element (1) is bent along the first line segment (L_1) and along lines (10) extending under 90° from the end of the line segment (L_1) to the same side as the cuts (6), that the upwards bent portions (8, 9) are secured to upwards extending side surfaces (30, 27) of the roof-penetrating element (4), the portion (8) positioned between the converging cuts being secured to a downwards facing side surface (30), following which the remaining portions of the element (1) are fastened by gluing, adhesion, welding or the like to the roof surface (5),
- that the second element (2a) is bent along the second line segment (L_2) and along a line (18) which under an angle of 90° extends from the same end of the line segment (L_2) and to the same side as the cut (11) forming an acute angle, that the upwards bent portions (15, 17) are secured to side surfaces (27, 28) of the roof penetrating element (4), the portion (15) posi-

roof penetrating element (4), the portion (15) positioned along the second line segment (L_2) being secured to a second side surface (27) adjacent to the downwards facing side surface (30) and the portion (11) forming an acute angle being placed on top, and the lower end (16) of the portion (15) positioned along the second line segment (L_2) being bent towards and secured to the downwards facing side surface (30) of the roof penetrating element (4), following which the remaining portions of the element (2a)) are fastened by gluing, adhesion, welding or the like to the roof surface (5),

- that the element (2b) mirror-inverted relative to the second element (2a) is fastened in a similar manner, and

- that the third element (3) is bent along the third line segment (L_3), that the upwards bent portion (21) is secured to the upwards facing side surface (28) of the roof penetrating element (4) and that the end portions (23) of the upwards bent portion (21) are bent around and secured to the second side surfaces (27), following which the remaining portions of the element (3) are secured by gluing, adhesion, welding or the like to the roof surface (5).

7. A method according to claim 6, in which the roof surface is made of concrete, c h a r a c t e r i z e d in that the elements (1, 2a, 2b, 3) are fastened directly on the concrete surface (5).

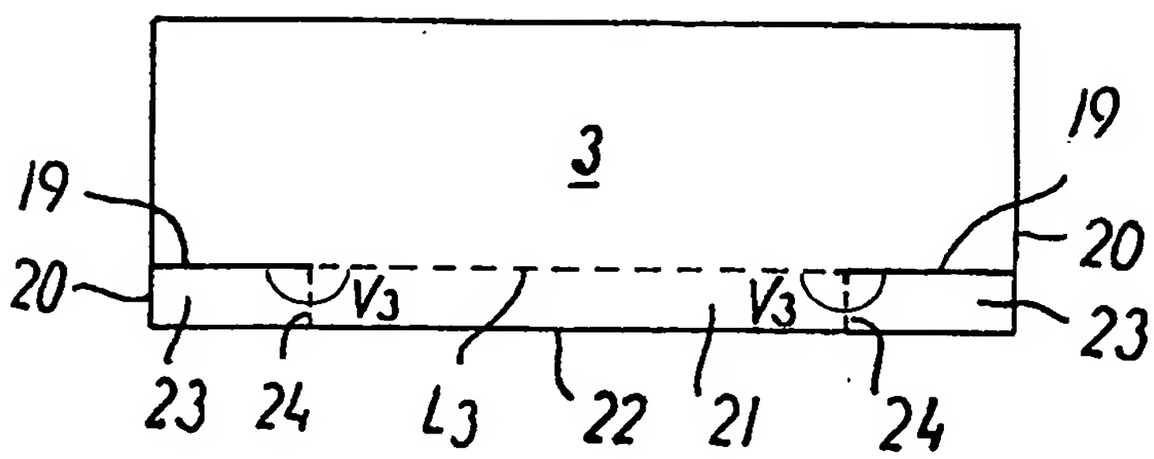

3
19
19
20
20
V_3
V_3
23
23
24
L_3
22
21
24
2b
18
17
11
V_{21}
L_2
13
15
V_{22}
16
14
12
2a
18
17
11
V_{21}
L_2
13
15
V_{22}
16
14
12
10
9
6
7
8
6
9
10
V_1
V_1
1
L_1

FIG. 1

214

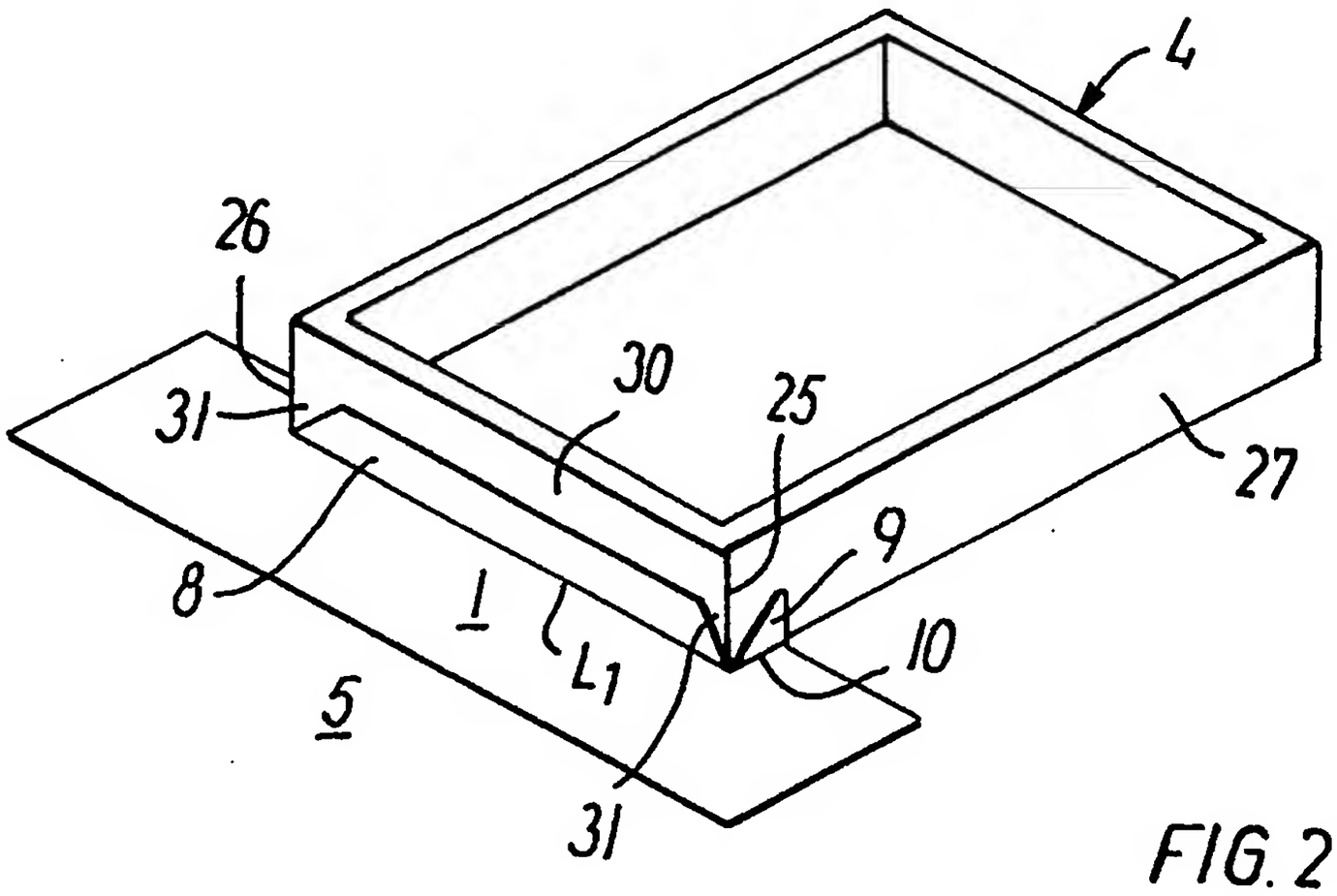


FIG. 2

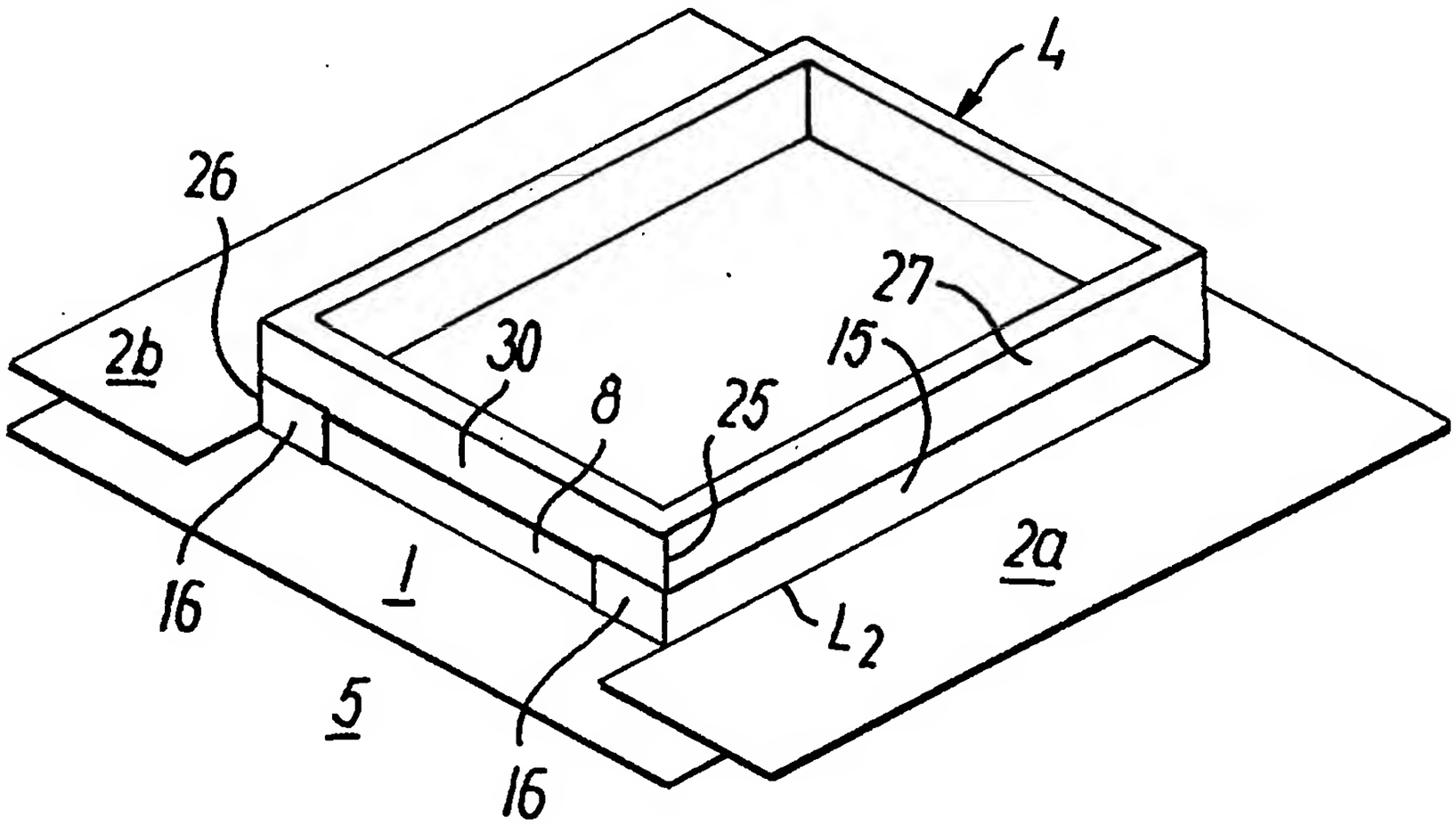


FIG. 3

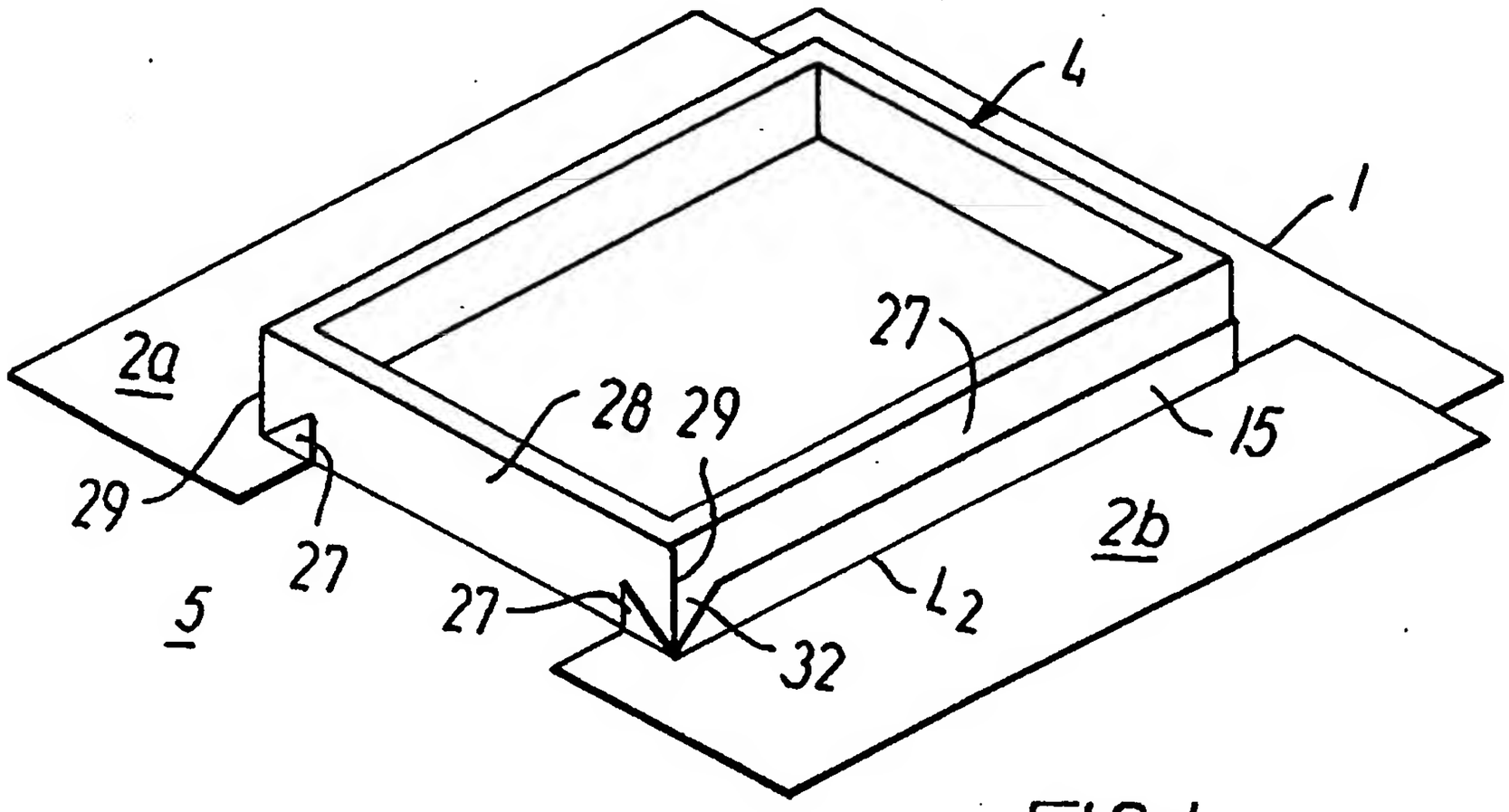


FIG. 4

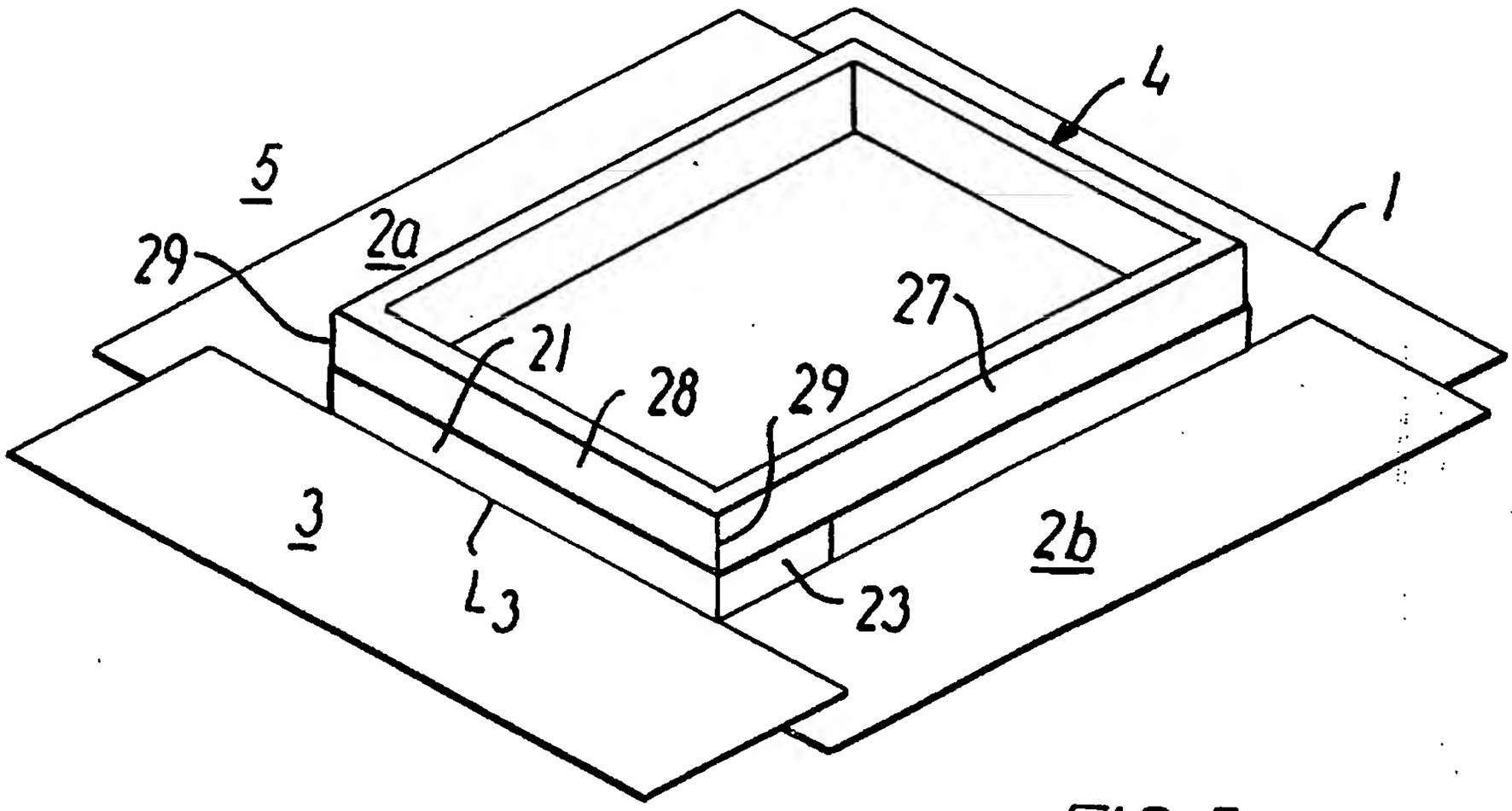


FIG. 5

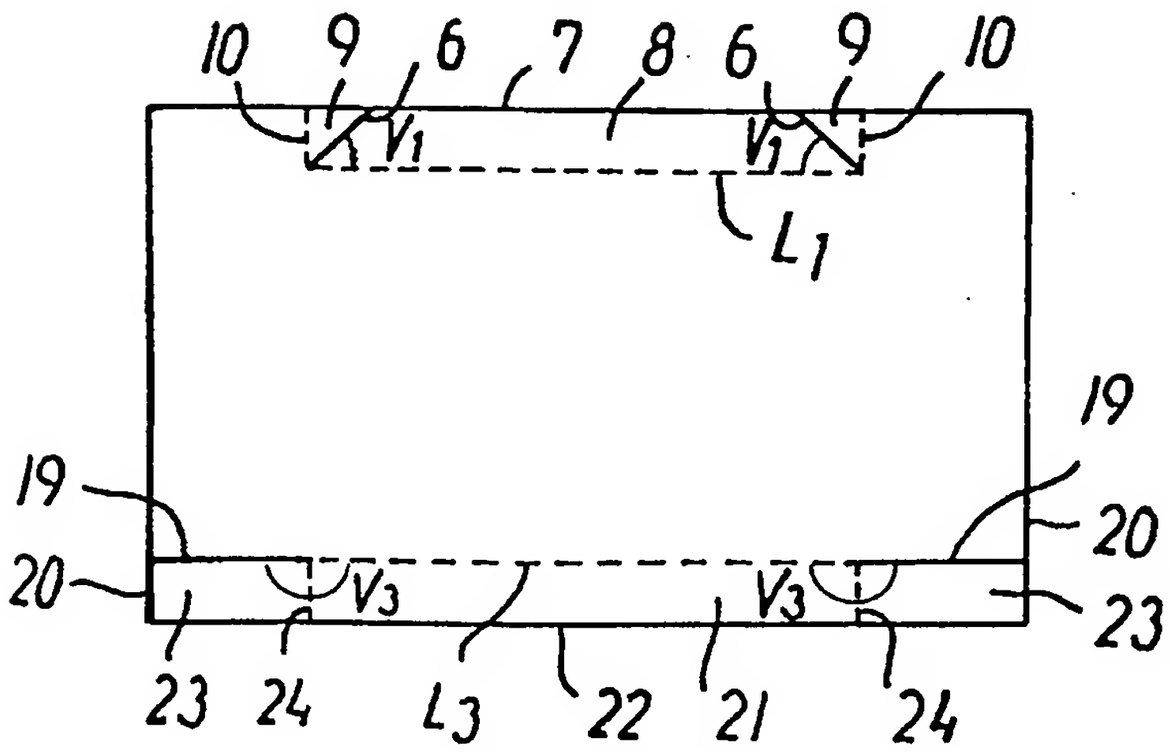

10
9
6
7
8
6
9
10
V1
V1
L1
19
19
20
20
V3
V3
23
23
24
L3
22
21
24

FIG.6

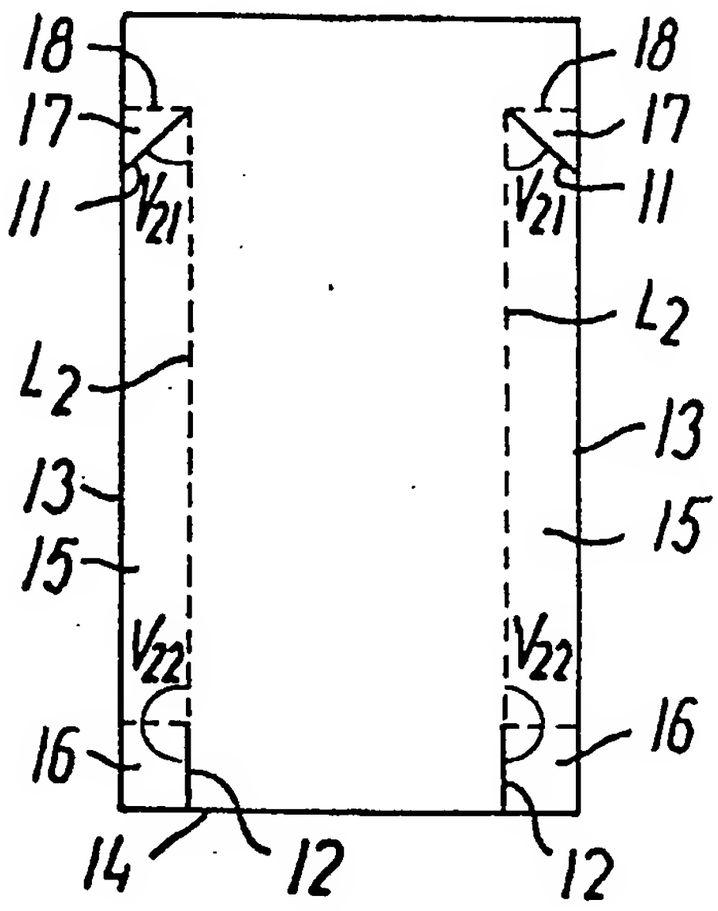

18
18
17
17
11
V21
V21
11
L2
L2
13
13
15
15
V22
V22
16
16
14
12
12

FIG.7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 98/00484

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: E04D 13/14
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: E04D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DK 98982 C (AKTIESELSKABET FOR KEMISK INDUSTRI ET AL), 31 August 1964 (31.08.64), figure 1, claim 1 --	1-7
A	DE 3603303 A1 (WIESNER, M.), 6 August 1987 (06.08.87), figure 3, claim 1 --	1-7
A	US 5077943 A (D.L. MCGADY), 7 January 1992 (07.01.92), figures 3,4, abstract --	1-7
A	US 5605019 A (D.E. MAZIEKIEN ET AL), 25 February 1997 (25.02.97), figures 1,2, abstract --	1-7

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 January 1999	25 -01- 1999
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Vilho Juvonen Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

01/12/98

International application No.
PCT/DK 98/00484

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DK 98982 C	31/08/64	DE 3119049 A,C	18/11/82
		GB 2099959 A,B	15/12/82
		JP 1613347 C	15/08/91
		JP 2039675 B	06/09/90
		JP 57200777 A	09/12/82
DE 3603303 A1	06/08/87	NONE	
US 5077943 A	07/01/92	NONE	
US 5605019 A	25/02/97	NONE	